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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/996,527	11/28/2001	Mamoru Nakasuji	4641-61168	3559

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EXAMINER

HUGHES, JAMES P

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/996,527

P.S.
Applicant(s)

NAKASUJI, MAMORU

Examiner

James P. Hughes

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11-28-01 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. Figures 3 and 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the specification does not support claims 3 or 9, which claim that the x-axis and y-axis have orientations along the x-axis and the y-axis, respectively. The specification discloses the opposite, that the magnetic-field-compensation coil 32, which produces the x-axis magnetic field, has y-axis symmetry; following the y-axis magnetic field compensation coil 33 has y-axis symmetry. (Pg. 10, line 20 – Pg. 11, line 3)

Claim Objections

3. Claim 13-15 are objected to under 37 CFR 1.75(c), as being of improper dependent form for not including all the limitations of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1, discloses more limitations than the CPB optical system.

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Following, claims 14 and 15 are objected to because they have the inherent deficiency, identified above, of claim 13, upon which they are dependent.

4. Claims 13 and 14 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Referring to claim 13, a CPB optical system does not further limit claim 1 as a CPB optical system is claimed in claim 1; A CPB microlithography apparatus does not further limit claim 13 as the CPB optical system disclosed in claim 1 (Line 11) is inherently part of the microlithography system disclosed in claim 1. Referring to claim 14, a CPB microlithography apparatus, comprising the CPB optical system of claim 13, does not further limit the CPB microlithography system of claim 1. Following, claims 14 and 15 are objected to because they inherently have the deficiencies, identified above, of claims 13 and 14 upon which they are dependent.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claim 15 is rejected under 35 U.S.C. 101 because the claim is directed to neither a “process” nor a “machine”, but rather embraces or overlaps two different statutory classes of invention set forth in 35 USC 101, see MPEP 2173.05(p)

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 3-5 and 9-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding claims 3 and 9, the specification discloses the opposite orientation of the x-axis and the y-axis coils as is claimed in claims 3 and 9, see comments in section 2 above. Claims 4, 5, and 10 are rejected because they are dependent on claims 3 and 9 and thus have the problems discussed above.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. Neither claim 15 nor 16 disclose a step in a process, which is necessary for a claim to a process.
8. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 16 recites the limitation "a CPB microlithography process" in line 2. There

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is insufficient antecedent basis for this limitation in the claim. A CPB microlithography process is not disclosed in claim1; a CPB microlithography system is disclosed.

9. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, because it is indefinite as discussed in the MPEP 2173.05(p). Claim 15 claims both an apparatus and the method steps of using the apparatus. "A single claim which claims both an apparatus and the method steps of using it was held to be ambiguous and properly rejected under 35 USC 112, second paragraph." MPEP 2173.05(p). Also see, *Ex parte Lyell*, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (5,304,811) in view of Luzzi (5,225,999). Yamada et al. (5,304,811) teaches a method and apparatus of a lithography system using a charged particle beam (CPB). Wherein, an illumination-optical system (top half of 10) comprising; a CPB source (14) generates an CPB which passes along an optical axis through a shaping aperture (15), a magnetic lens (16), and a deflector (17) prior to illuminating a selected region on a reticle (20), which forms a patterned beam carrying an aerial image of the illuminated reticle (20) region; and a projection-optical system (bottom half of 10) causes the patterned beam to form an actual image of the illuminated reticle region on a corresponding region on a surface of a substrate (40). (Col. 4, lines 5-68) The

reticle (20) is moved and controlled by a reticle controller (55), which controls and moves the reticle stage (57); such is common in lithography systems. (Col. 5, lines 45-50)

Yamada teaches several magnetic lenses, deflectors, and compensation coils (21,22,23,24,41,42,44,45) that are arranged above and below the reticle (20) – between the reticle and the illumination-optical system and between the reticle and the projection-optical system – and are assembled compact as possible and very close to the reticle (20) to limit the effect of stray exterior magnetic fields. (Col. 10, lines 5-23)

Luzzi (5,225,999) teaches a method and apparatus providing magnetic environmental stabilization for effective operation of magnetically sensitive instruments used in applications such as electron beam lithography (e.g. CPB lithography) and electron microscopy. (Col. 2, lines 25-35)

A magnetic-field sensor (14) detects DC and AC magnetic fields external to the CPB optical system of the CPB instrument (10) – including fields created via the operation of the CPB instrument (10) – then a magnetic-field-compensation circuit (18, 20) sends an electrical current to the magnetic-field-compensation coil (16) to generate equal and opposite magnetic fields to cancel at least a portion of the fields detected by the magnetic-field sensor (14). (Col. 4, lines 9-33 and Col. 5, line 25-69)

Luzzi discloses, as commonly known background information, that magnetic environments contain horizontal (x and y-axis) and vertical (z-axis) field components and it is desired to reduce both horizontal and vertical components. Wherein the z-axis component will act as an electromagnetic lens over the entire length of the particle beam column – thus effecting the affecting the focusing of the beam. (Col. 1, lines 34-62)

While Luzzi discloses systems that are larger than the protected CBP instrument, the apparatus and methods are directed at the charged particle beam. Specifically, the z-axis coil should be placed surrounding the entire optical axis of the particle beam. Because a vertically oriented magnetic field will require stabilization/cancellation over the entire length of the instrument. (Col. 3, lines 42-50) Following, the x and y-axis coils should be placed as to protect the beam from the horizontal magnetic field components. It is commonly known in the art that a detector with individual x, y, and z-axes may be placed to detect field components in the x, y, and z-axis, respectively. Additionally, it is well known in the art – following the “the right-hand rule” – that to produce a magnetic field in the x-axial or y-axial direction, a current may be supplied in the y-axial or x-axial direction, respectively; wherein, a current supplied in the x-axial direction will not produce a magnetic field in the x-axial direction.

Regarding claim 12, Luzzi teaches that the processor (18) monitors the control settings of the magnetic sensor and uses these values to determine the appropriate offset to the magnetic field compensation coils. The processor (18) may calculate the offset value via the use of pre-determined look-up tables or polynomial equations. (Col. 5, lines 54-68)

However, Yamada does not teach a detection and compensation system for magnetic fields.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the detection and compensation system and process for magnetic fields of Luzzi in the lithography apparatus and method of Yamada because Luzzi teaches that the detection and compensation system and process can improve the performance of CPB lithography systems

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(Col. 1, lines 34-62), while Yamada is aware of this problem and teaches a design to reduce, but not compensate for, the effects of external magnetic fields (Col. 10, lines 5-23).

Regarding claim 6, Yamada in view of Luzzi teaches the claimed invention and process except for placing the magnetic field compensation coil closer to the optical axis than the magnetic-field sensor. It would have been obvious matter of design choice to one of ordinary skill in the art at the time of the invention to place the magnetic field compensation coil and sensor in this arrangement to produce the compensation field closer to the protected element than the sensor element.

Regarding claim 7, Yamada in view of Luzzi teaches the claimed invention and process except for a single coil that may act as a magnetic field sensor and compensation coil. It would have been obvious matter of design choice to one of ordinary skill in the art at the time of the invention to make this combination to reduce the size or number of the necessary components.

Yamada in view of Luzzi teaches the claimed invention and process except for placing the magnetic field compensation coil and the magnetic-field sensor in the CPB apparatus. It would have been an obvious matter of design choice to place the magnetic field compensation coil and the magnetic-field sensor in the CPB apparatus, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955) Following, it would be obvious to place the detection and compensation system between the reticle and the illumination-optical system and/or between the reticle and the projection-optical system because that is where the CPB is in need of focusing and it is where Yamada teaches the design to reduce the effects of external magnetic fields. (Col. 10, lines 5-23)

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Honess et al. (5,126,669) teaches a method of detecting and compensating for external magnetic fields using helmholtz coils with x, y, and z orientations.

Shattil (6,208,135) teaches a system for canceling electromagnetic fields.

Griese et al. (3,801,877) teaches a system for producing a region free from interfering magnetic fields.

Buhler (5,117,155) teaches a method and apparatus for nulling an ambient magnetic field.

Okino (6,194,732) teaches a CPB exposure system using a common lithography system; wherein, a reticle (10) is supported and moved by a reticle stage (11).

Hirata (3,749,964) teaches an electron beam system wherein coils are wound in a circular manner (Fig. 1)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James P. Hughes whose telephone number is 703-305-5675. The examiner can normally be reached on Monday - Friday 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on 703-308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding
should be directed to the receptionist whose telephone number is 703-308-⁰⁹⁵⁶~~1782~~.

James P. Hughes
Examiner
Art Unit 2881

JH

February 24, 2003


JOHN R. LEE
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